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ABSTRACT

This publication is designed to provide assistance in the acquisition of facilities and program development in environmental education. The descriptive material is grouped under three headings: planning the program, developing the facility, and utilizing and maintaining the outdoor laboratory. Appendices include sources of environmental education materials, educational laboratories, and conservation organizations. (BP)

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GUIDELINES FOR

PLANNING, DEVELOPING, UTILIZING AND MAINTAINING OUTDOOR ENVIRONMENTAL EDUCATION LABORATORIES

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The Pennsylvania State University, College of Agricultur
Department of Agricultural Education, University Park, Pennsyl ania
In cooperation with
Pennsylvania Department of Education
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GUIDELINES FOR PLANNING, DEVELOPING, UTILIZING AND MAINTAINING OUTDOOR ENVIRONMENTAL EDUCATION LABORATORIES

by

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Teacher Education Research Series
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The Pennsylvania State University
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Foreword

New developments in education result from expanding objectives. Environmental Education is no exception. It is important, if the human species is to be more aware of his natural environment, that there be a clear picture of the objectives for having an Outdoor Environmental Education Laboratory.

If we can agree that only the human being as a part of the natural environment is capable of substantially altering or manipulating the environment, for better or worse, we have a starting point. In fact, we must realize that the human impact on the natural scene is closely tied to population density. That this is equally true of plant, animal and insect life is obvious.

If this is true, environmental education must be concerned with providing facilities and instructional programs that demonstrate the cause and effect relationships of human, animal, organic and climatic forces in shaping and reshaping the ecosystem.

It is not enough that curriculum developers and teachers have a basic concept of man in relation to his environment. The goal must be to show that the natural environment is not static, can in fact be changed and will be changed by careful management or by neglect and abuse.

When we have arrived at something resembling a philosophic base for environmental education, we can begin to look for natural settings to illustrate or dramatize the effects of human and natural forces in shaping our surroundings. This publication provides some assistance in the acquisition of facilities and in program development.

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PLANNING THE PROGRAM

Whether the idea or impetus for an outdoor environmental education laboratory begins with one individual or a small group of teachers, it is soon evident that success depends upon the development of a comprehensive plan involving representatives from all departments and divisions within the school. Planning the program includes:

Objectives
Advance Preparation
Securing Support of Administrative Personnel
Securing Approval by the Board of Education
Organizing the School Personnel
Training the Faculty Members
Using Resource Personnel
Cooperating Agencies of County Conservation Districts
Integrating Environmental Education into the Curriculum
Arranging Financial Plans

Objectives

It is generally agreed that the development of a program to teach conservation and environmental education should have four key objectives:

1. The program of instruction may be presented in separate planned courses or integrated into the present curriculum.
2. The program should be developed so that it includes all grades K through 12.
3. Instruction should be included for all subject matter areas in the curriculum.
4. The program should be action oriented so that students can learn directly from the natural environment in support of their normal classroom instruction.

Advance Preparation

Before official approval is requested, the original proposal should be developed to include the following:

1. A statement of the purpose.
2. A list of goals and educational objectives.
3. An estimate of the costs required.
4. The results of a preliminary appraisal of the possible site.
5. A proposed plan showing how the center is to be used.
6. An indication of support by resource persons in the area.
7. Some evidence of support from representatives of community groups and organizations.

Securing Support of Administrative Personnel

One of the most important steps in launching a new program of this magnitude is to secure approval and support of all the administrative personnel who will be involved in the venture. In most cases this will be the superintendent of schools and the elementary and secondary principals or their counterparts in Area Vocational Technical Schools. It may involve other key persons such as a curriculum coordinator, guidance counselors and possibly those responsible for the instructional media center. If adequate preparation has been made and the plan is reasonable in its scope, operation and cost, there should be few problems in achieving enthusiastic support and additional effective leadership in the project.

Securing Approval by the Board of Education

An equally important phase of the early development is to have the approval of those elected community officials who are responsible for the educational program in their districts and their communities. The proposal at this stage should be comprehensive enough so that its official adoption will serve as the beginning guidelines to its operation.

Organizing the School Personnel

If the eventual program is to involve all grade levels and all subject areas, it is essential to have a key person selected from each of these divisions to serve on the faculty committee. Hopefully, they will be teachers keenly interested in conservation and environmental education and willing to volunteer their time and efforts toward this end. If faculty can be reimbursed for extra time spent beyond the normal school working

hours, the job of organizing committee meetings and assigning tasks will be greatly facilitated.

Training the Faculty Members

Teachers need to feel that they have a degree of competency before they teach a subject or attempt a new approach to lessons taught previously. If they feel insecure in identifying plant specimens and working with soils, or if they have little background in conducting field trips and directing individual study, they will have a tendency to avoid such activities. Some methods must be found to help them secure such experience and develop these competencies.

In many schools, in-service days are scheduled each year. If a part of these training sessions can be scheduled as well-planned demonstrations of teaching in the out-of-doors, much can be accomplished to create enthusiasm and develop techniques. Teachers can learn from each other by sharing their experiences and backgrounds and become proficient in those phases which involve their grade level or subject areas.

Using Resource Personnel

Cooperative efforts between educators and conservation resource personnel is a most effective method of planning and advancing programs. Teachers need to become acquainted with these persons and to understand the contributions each of them can offer. Conservationists need to realize the importance of educating youth about the programs they are promoting.

Conservation districts have been established in every county in Pennsylvania with the exception of Philadelphia. They are organized under a Board of Directors composed of rural and urban personnel interested in conservation programs of their county. In many instances, conservation districts now employ executive assistants to aid in carrying out the program. Trained and experienced specialists are assigned to each district by the Soil Conservation Service.

The Pennsylvania Association of Conservation District Directors and the Soil Conservation Service have a policy of supporting environmental education as an integral part of the curriculum in elementary,

middle, junior high and high schools, and as part of teacher education programs. Securing the assistance and cooperation of this organization and its personnel is a most important step in inventorying and developing a tract of land to be used for education purposes.

Cooperating Agencies of County Conservation Districts

Conservation districts have established memoranda of understanding with many related agencies within their counties. These organizations and agencies interested in or having a responsibility for soil and water conservation, land use planning and watershed protection assist the conservation districts in carrying out their programs and as a result, consultive help on a wide range of subjects is available through the conservation district. In every community, trained and experienced persons are available in some of the following agencies or organizations:

1. Agricultural Stabilization and Conservation Service
2. Cooperative Extension Service
3. Boy Scouts of America
4. Department of Education
5. Department of Environmental Resources
   a. Bureau of Air Quality and Noise Control
   b. Bureau of Community Environmental Control
   c. Bureau of Forestry
   d. Bureau of Land Protection
   e. Bureau of Soil and Water Conservation
   f. Bureau of State Parks
   g. Bureau of Water Quality Management
6. Department of Transportation
7. Farmers Home Administration
8. Fish Commission
9. Game Commission
10. Planning and Zoning Commission

Agricultural Stabilization and Conservation Service

This agency can give assistance in making cost-sharing available for installation of conservation practices in soil, water, woodland, wildlife and recreation.

Cooperative Extension Service

Personnel within the Cooperative Extension Service are in a position to give education assistance to interested individuals or groups through individual help, demonstrations, meetings and publications on subjects relating to resources conservation and use as well as agricultural production and youth development.

Boy Scouts

In some counties cooperation between this organization and the conservation district exists in regards to information and education, tree and shrub planting, and community beautification and conservation projects.

Department of Education

The cooperation between Conservation Districts and the Pennsylvania Department of Education is primarily for the purpose of teaching environmental education and giving assistance in sponsored projects for youth groups.

Department of Environmental Resources

This department was organized by the Commonwealth of Pennsylvania early in the 1970's. It now encompasses some of the then existing departments of state government as bureaus and has created additional bureaus responsible for the various areas of environmental resources. The organizational structure of the Department of Environmental Resources is included in Appendix A of this publication. Brief descriptions of the bureaus most directly involved with environmental education follow:

Bureau of Air Quality and Noise Control. Develops air quality standards and air resource management techniques, establishes Air Quality Monitoring Systems, acts on permits, issues orders for the control of air pollution, conducts research and assists in local air pollution control programs.

Bureau of Community Environmental Control. Inspects, reviews plans and enforces regulations on sanitation in institutions, schools, recreational areas and facilities, mobile home parks, food service establishments and migrant labor camps; approves permits for on-lot sewage systems and assists local governments in housing code enforcement; administers the Sewage Facilities Act, administers a statewide insect

and rodent control program; administers grants to municipalities for sewerage planning, local on-lot sewage system enforcement and insect and rat control.

Bureau of Forestry. Manages the nearly two million acres of State forest lands and prevents and controls forest fires on all forested lands throughout the State; conducts annual programs to protect forest lands from insect damage; produces tree seedlings for reforestation of idle land and provides technical forest management assistance to owners of forest land.

Bureau of Land Protection. Administers the development of local solid waste management plans; develops and maintains a state-wide solid waste management plan and solid waste management regulations for the Commonwealth.

Bureau of Soil and Water Consevation. Assists local conservation districts with financial aid to employ professional help, provides financial assistance for the support of small watersheds, and supports local districts in soil and water conservation efforts.

Bureau of State Parks. Administers the operation, maintenance and protection of the State Park System. Maintains a comprehensive outdoor recreational program, cooperates with other agencies (Federal, State and local) associated with outdoor recreational development or grants-in-aid; encourages private enterprise to provide related services; participates in nature interpretation and environmental education activities.

Bureau of Water Quality Management. Establishes and regulates water quality standards, develops a statewide Water Quality and Waste Water Management Plan, sets technical standards, reviews applications and issues permits for water works, waste water collection systems, sewage and industrial waste treatment systems, mine drainage and erosion control and bathing places; assists communities in financing construction of sewage treatment plants, reviews plans for construction or repair of dams and encroachments, inspects treatment facilities, investigates fish kills and pollution incidents, makes water quality studies and investigations, and coordinates Water Quality Research and Development programs.

Department of Transportation

The cooperation of this agency and the County District exists to control roadside erosion and drainage and analyzing and testing soils to

determine engineering properties for highway construction. The environmental impact on communities where new road construction is contemplated is receiving increased attention.

Farmers Home Administration

This agency makes loans to eligible borrowers for watershed development, soil conservation, recreational development, shifts in land use and forest establishment.

Fish Commission

The local Waterway Patrolman can serve as a resource person in areas that pertain to pond or stream ecology, kinds and characteristics of game fish, hatcheries, stocking or other related programs.

Game Commission

The best contact persons in any given community are the Game Protector and the Gamelands Manager. They are familiar with all aspects of the organization and are in a position to assist in any program which deals with wildlife propagation and protection.

Planning and Zoning Commissions

The scope of these commissions may involve a single township, borough or city or they may be district, region or county in organization. Their purposes and functions are important to any environmental education program.

Integrating Environmental Education into the Curriculum

The following subject areas should be considered in planning the program:

1. Land and soils
2. Water and marine life
3. Air
4. Wildlife
5. Woodlands
6. Crop production
7. Plants and weeds
8. Animal, birds and insects
9. Climate

10. Space
11. Population control
12. Resource depletion
13. Land use planning
14. Sewage disposal
15. Solid waste disposal
16. Pesticides and herbicides
17. Littering
18. Air pollution
19. Noise pollution
20. Esthetics

A function of the faculty committee would be the determination of the subject matter to be included at each grade level and a suggested list of activities and experiences to be gained in the education laboratory. At the secondary level, areas of emphasis can be assigned to the various departments. Some examples of activities by subject matter areas are:

1. Vocational Agriculture
    a. Education in land use and management
    b. Preparing for forestry contests
    c. Preparing for agronomy contest
    d. Preparing for ornamental landscape contest
    e. Planting trees and shrubs
2. Industrial Arts
    a. Designing and building trail markers and signs
    b. Building and installing benches
    c. Training in surveying
3. Mathematics (including metric measurements)
    a. Using land measurement techniques
    b. Determining tree heights, diameters and volumes
    c. Determining stream flow per second
4. Home Economics
    a. Learning camp cookery
    b. Studying edible plants and herbs
    c. Feeding birds
5. Art
    a. Sketching landscape areas
    b. Making floral and dried plant arrangements
    c. Studying nature photography

6. Science

   a. Identifying aquatic organisms, ferns, mosses and algae
   b. Studying biotic communities, plant succession, adaptations, competition and seed dispersal
   c. Propagation, grafting and layering plants

7. Social Studies

   a. Learning about community planning, zoning and park areas
   b. Studying problems of water, air and noise pollution
   c. Understanding population effect on natural resources

8. Physical Education

   a. Participating in hiking, biking and individual outdoor sports
   b. Participating in outdoor games
   c. Learning about recreation in public parks

9. Music

   a. Learning songs about nature and the outdoors
   b. Attending outdoor concerts

10. Language Arts

   a. Writing articles for school newspapers
   b. Preparing programs for radio and television
   c. Maintaining a historical narrative of the center

11. Audio-Visual

   a. Presenting slides, photographs or motion pictures of activities
   b. Recording sounds of nature such as bird calls
   c. Using audio-visual library on nature subjects

Some consideration should be given to additions to the regular prescribed courses such as individual studies, electives and perhaps an extension of the program through camping and many other activities.

The imagination and resourcefulness of the teachers and students are the only limits in planning and participating in worthwhile learning experiences. The emphasis needs to be placed on teaching in actual situations rather than simulated regular classroom studies.

Arranging Financial Plans

The budget requirements can vary from meager to major sums depending on how elaborately the facility is developed. Several possible sources of funding are:

1. Financing by the regular school budget.
2. Special program grants through state funding.
3. Community support by service organizations.
4. Gifts or subscriptions to establish an endowment fund.

In most instances where the center is operated by an individual school district and the land is already under its ownership, an annual budget request for its operation is the only necessary consideration. Some budget items to consider are:

1. Salaries for program development.
2. Expenses for consultants.
3. Pupil transportation costs.
4. Site installations -- signs, markers and benches.
5. Plant materials -- trees, shrubs and ornamentals.
6. Maintenance costs -- road and trail construction and mowing.
7. Instructional equipment -- slope gauges, tree calipers, soil augers, transits, meterological instruments and hand tools.
8. Audio-visual materials -- slides, films, tapes and cameras.
9. References -- books, periodicals, bulletins and circulars.
10. Program materials -- courses of study and brochures.

DEVELOPING THE FACILITY

The establishment of an Outdoor Environmental Education Laboratory in any individual school district cannot fit an exact pattern. Among many factors, the community and its characteristics and the location and qualities of the site to be developed are the chief ones which determine the physical features of this type of educational facility. Major considerations in developing the facility are:

Acquiring the Site
Analyzing the Site
Mapping the Site
Identifying the Educational Features
Establishing Trails
Providing Signs, Labels and Markers
Providing Access Roads and Parking Areas
Establishing Demonstration and Teaching Areas
Developing a Plan for Future Additions
Examples of Outdoor Environmental Education Laboratories

Acquiring the Site

There are at least three ways to acquire tracts of land for this purpose:

1. Land now owned by the school district.
2. Land to be purchased by the school district.
3. Land to be leased or rented by the school district.

Land Now Owned by the School District

Many of the sites purchased for school use during the last two decades are located in strictly rural areas and involved the purchase of one or more farms. After school buildings are erected and athletic fields established, often there remain many acres which may be ideal for outdoor classrooms.

An advantage of school owned sites is the close proximity to the school; therefore, the laboratory is readily accessible to students and teachers. No time consuming arrangements for special permits,

transportation, lunches and comfort facilities are required. Likewise there is more freedom to develop the laboratory for the desired experiences and activities.

Land To Be Purchased by the School District

If no appropriate sites are available on presently owned property, securing such a parcel of land is the number one priority.

Any prospective site should be large enough to meet immediate and future needs, and should be as undeveloped as possible. It should have some native woodland and, if possible, fields, meadows, streams, marshes and ponds so that a wide range of activities can be developed.

Land To Be Leased or Rented by the School District

Availability of suitable land and the attitude of the owner would be the determining factors in using a site under some form of lease or rent agreement. Such land may be under ownership of an individual, a corporation or a government agency.

A more restricted program may result when ownership of the site by the school is not feasible. In such cases, comprehensive plans and close working relationships with the owner must be developed. Owners must be in agreement with the philosophy of outdoor environmental education. A long-term lease agreement would be essential to ensure a degree of permanency.

Analyzing the Site

A most important step in developing any land area for use as an educational facility is a thorough site analysis by competent personnel. Site planning involves careful matching of the desired program with the educational potential of the land tract. All of the resource personnel in the community who have expertise in some phase of natural resource use and conservation should be consulted during the planning phases of the outdoor area. A suggested list of such trained and experienced persons has been listed previously.

Mapping the Site

An important tool in planning, developing and using an outdoor educational area is a drawing or map which clearly shows the schematic plan of the entire plot and the location of its various features. The following existing aids may be secured in making such a design:

1. Deed survey
2. Aerial photograph
3. Soil survey
4. Topographic map

Deed Survey

Most school owned property should have a surveyor's description of the property's boundaries and possibly the surveyor's sketch if the area was plotted. If such information is not available at the school, it probably can be found in the office of the Recorder in the county seat in which the property is located. In many counties the Tax Assessment Office has maps and descriptions of real property.

Aerial Photograph

All areas in the United States are photographed at periodic intervals and prints can be purchased by any individual. Personnel of the Soil Conservation Service or the Agricultural Stabilization and Conservation Service can provide the number identifying the photograph on which the land is located. They can also provide the ordering forms and the information on cost, scale and other particulars. The scale 660 feet to the inch is often a desirable sized photograph because each square inch is equal to ten acres. Quadrant photographs showing greater detail and with a scale of 330 feet per inch are also available.

Soil Survey

The present status of Soil Survey reports vary widely in different counties. Soil technologists have mapped the soil characteristics of 87 percent of the state and expect to complete the survey work by 1980. Interpretations are drawn as to the suitability of various soils for

different land uses. The Soil Conservation Service personnel in each county could provide this information for all areas that have been surveyed.

Topographic Map

Topographic maps show many features that would be of value in outdoor education. Direction, bearings, latitude and longitude, elevations, mountains and streams and man-made developments are included. Index maps can be purchased from the U. S. Department of the Interior which will identify the map needed for any specific area. In Pennsylvania the maps can be purchased by requesting information on the Topographic and Geologic Survey from the Pennsylvania Department of Internal Affairs.

Identifying the Educational Features

With the assistance of resource persons an inventory can be made of the site to identify the existing structures, the natural features and the resource areas significant to the conservation education objectives of all grade levels. This inventory will vary with the geographic location and the size of the school site. The following resources should be considered:

1. Soil characteristics.
2. Water resources.
3. Wooded areas.
4. Wildlife survey.
5. Plant specimens.
6. Geological features.
7. Historical features.

Soil Characteristics

Students in vocational agriculture and FFA members learn much about soils in their land judging activity. Slope, depth, type and texture, internal drainage, organic matter, stoniness, capability classes and suggested land use are some of the informational skills developed. All students in the school community could benefit from such a program and should receive some type of instruction about soils, their formation, their potential, their use and their conservation.

Water Resources

Pond and stream ecology, marshes, sinks, wells, sources of pollution, stream bank erosion and siltation are all a part of a concept which can be developed in an outdoor setting.

Wooded Areas

Species identification, mensuration, forest management, establishment, protection and multi-purpose use are activities and concepts which can be incorporated in a forested area. New plantations can be considered or planned.

Wildlife Survey

Animals habitats include: bee, den and nesting trees; shrubs and fallen logs; and ground dens or burrows. These habitats along with evidence of wildlife tracks or feces all have a place or function in developing concepts about wildlife resources. Game birds and song birds are an important aspect of the outdoor classroom.

Plant Specimens

Vegetation such as grasses, shrubs, weeds, wildflowers and plants harmful to people are a part of the natural setting. Studies in plant succession and, in some instances, cultivated grain or forage crops have a place in the environmental education program.

Geological Features

Land profiles on exposed banks or excavations, kinds and location of rocks, outcrops, boulders, ledges, cliffs and sinks can be used in learning to read the landscape and tell the history of formation.

Historical Features

Remnants such as stone and split rail fences, old orchards, artifacts such as arrow heads and stone tools may be features of a site and have a place in the plan for an outdoor laboratory.

Establishing Trails

Effective trail design and layout can do much to enhance outdoor conservation education. Such a facility provides access for people and guides them to real objects, real situations and demonstrations. The objective of a trail system is to show in an organized manner everything that a tract of land offers. Generally, trails should be designed as loops, each of which takes about 45 minutes to cover. For group use they should normally be six to ten feet in width. Consideration should be given, however, to protection of the site so that its features be available for future visitors. Several types of trails are:

1. Self-guided trail
2. General trail
3. Subject trails
4. Special-use trails

Self-guided Trails

Locations should be marked with numbers or letters which correspond to a set of written descriptions carried by persons making the observations. They may serve a purpose under some conditions but cannot replace interpretive instructions by an experienced teacher or resource person.

General Trails

They connect points of interest throughout the nature center in the order they occur and include whatever is on the landscape.

Subject Trails

These are designed to consider only one subject such as a soil trail, a woodland trail, a wildlife trail, an open field trail or any similar specified purpose.

Special-use Trails

These trails are designed for the physically or mentally handicapped as well as those for the gifted where individual studies could be conducted. Trails for special uses such as equestrian, bicycle, trailbikes and snowmobile have questionable value on school controlled sites because of their limited size and the danger of damage to terrain and plant specimens.

Providing Signs, Labels and Markers

Signs, labels and markers can have a place in giving directions or designations. Because of the cost and time involved in construction, installation and maintenance they should be limited in number and size and not elaborate in design. An entrance sign which includes the name of the educational center and possibly the date of establishment is the most important. It serves to fix in the public's mind the location, the purpose and the importance of the facility. All signs and markers should have a natural appearance, be uniform throughout the area and be brief, durable, accurate and easy to read.

Providing Access Roads and Parking Areas

Access roads and parking areas are necessary if students are transported to the outdoor laboratory by school busses. Access roads should be limited to the minimum required to service the center. All weather surfacing may be practical if the laboratory is used throughout the entire year. A parking area and turning area of adequate size is a necessity. Provision for sanitary toilet facilities should be considered.

Establishing Demonstration and Teaching Areas

Demonstration areas and teaching stations along trails can be established wherever specific demonstrations are to be conducted. A class could assemble around a soil pit, a tree to be measured, an arboretum or any other appropriate place where a lesson could be taught. An outdoor seating area large enough to accomodate a class is a practical installation and can be constructed easily and at low cost.

Developing a Plan for Future Additions

An outdoor education area comes into being as a process of logical development. Its simplicity or complexity depends upon those who give it direction, emphasis and funding. More important than the elaborate installations is the imagination, ingenuity and resourcefulness of its director and teachers. As the need arises features may be added. A suggested list follows:

1. Arboretums
2. Bird feeders and baths
3. Council rings
4. Geology walls
5. Interpretive buildings or classrooms
6. Nurseries
7. Observation platforms
8. Photographer's blinds
9. Picnic shelters or tables
10. Planetariums
11. Plantations
12. Ponds
13. Sun dials
14. Weather stations
15. Wildlife feeders and salt licks
16. Life-time sports areas such as golf, archery, rifle range, trap shooting, fly casting, plug casting and ice fishing

Examples of Outdoor Environmental Education Laboratories

Learning by doing has long been the motto of teachers of agriculture and FFA members. Field trips, tours, live demonstrations, cooperative projects and activities such as "Building Our American Communities" have been consistently used in the teaching-learning procedure. It is only logical that such personnel with a background of "outside the classroom experience" and with a practical knowledge in many of our natural resources would take leadership in developing outdoor environmental education laboratories.

Appendix B includes three schematic plans of such facilities in existence. They exemplify variations in size of six acres, 30 acres and 65 acres and include a wide range of features appropriate for use in an environmental program. A fourth example was a suggested plan prepared by R. W. Schilling, at that time a Student Teacher, featuring a nature area, nursery and turf plots surrounding a three-hole golf course.

UTILIZING AND MAINTAINING THE OUTDOOR LABORATORY

Developing programs that will stimulate the wise educational use of the center is of paramount importance. Its design and physical development should be such that people will use it toward the end of accomplishing their educational, scientific, cultural and recreational goals.

Some suggested ideas for planning student activities and providing demonstrations that emphasize the use of the facility are:

Plan for Daily Activities
Have a Calendar of Special Events
Plan for Seasonal Events
Use Evening Programs
Plan Programs by Grade Levels
Use Career Exploration Programs
Organize Clubs for Specific Interests
Use Bulletin Boards and Exhibits
Plan Programs for Adults
Cooperate with Other School Districts
Establish a System for Memorials
List Demonstrations and Student Activities
Publicize the Program
Maintain the Facility
Keep Records

Plan for Daily Activities

Many things relating to environment occur at any given moment. If instruments are available to observe weather phenomena, someone should be assigned on a regular basis to read and record temperatures, barometric pressures, humidities, amounts of rainfall or snowfall and wind velocities and directions. If information of this type can be displayed where it is readily observed by the student body, a daily exposure to program events will result. Other frequent tasks such as watering plants, servicing bird and wildlife feeders and recording observations about an experiment in progress can provide continuous student experience.

Have a Calendar of Special Events

Numerous events are scheduled on a state or national basis, many by special proclamation of the President or a state's governor. Examples are: Arbor Day, Citizenship Day, Soil Stewardship Week, Conservation Week, Earth Week, Wildlife Conservation Week and Environmental Week. Well planned activities relevant to these events will have an impact on the school's program.

Plan for Seasonal Events

A year-round concept of using the laboratory can be created by emphasizing the seasonal changes. Examples could include a fall foliage program, a winter wildlife study, spring wild-flower exhibit, forest fire danger periods or emphasis on the bounties of nature in preparation for Thanksgiving celebration. Measuring and recording the diameter of a specific tree the same date each year would be another seasonal event.

Use Evening Programs

Celestial observations in conjunction with planetarium programs could be scheduled for after-dark programs. Learning to locate and identify constellations, stars and planets and understanding their use in direction finding or navigation is a good application of space science.

Plan Programs by Grade Levels

Designating a special day as Sixth Grade Conservation Day or Seventh Grade Environmental Day is a proven method of involving the students, teachers and administrators in activities using the outdoor classroom. Training student resource persons in higher grade levels to demonstrate their proficiencies to lower grades is an effective procedure.

Use Career Exploration Programs

Job activities and skills in forestry, wildlife management, land use planning and conservation can be demonstrated or practiced using the resources of the outdoor laboratory.

Organize Club Programs for Specific Interests

Nature clubs, fly-tying clubs, insect study and collections are examples of activities relevant to the use of the out-of-doors. Interest groups can be organized as clubs.

Use Bulletin Boards and Exhibits

The effective display of pictures, slides, specimens, collections and newspaper articles as they relate to activities in the outdoor laboratory can give it continual emphasis.

Plan Programs for Adults

Gaining community support for an environmental education program and the outdoor laboratory can have many beneficial results. Service clubs, garden clubs, fish and game associations and any other community organization should be invited to participate in a program which explains the purpose and demonstrates the educational value of the facility.

Cooperate with Other School Districts

Offering the use of the facility to other school districts may have merit if they are within a convenient traveling distance. The Intermediate Unit of the school district may be the agency to help plan for such use. It also could provide assistance to the program by securing films and other visual materials to be available to all schools within its jurisdiction.

Establish a System for Memorials

Frequently individuals or organizations desire to establish memorials to mark an historic event, a special anniversary or the memory of a deceased person. A system whereby they could purchase and plant a tree or dedicate a special facility is a desirable feature of the environmental center.

List Demonstrations or Student Activities

Another method of emphasizing the use of the outdoor laboratory would be the listing of definite demonstrations or student activities which could be conducted.

Activity areas and specific activities will vary with the facility. Some examples of such demonstrations or activities by areas are:

Soil Conservation Activities:

1. Soil sampling a given area
2. Procedures for testing soils for fertility
3. Testing soils for acidity
4. Measuring slopes
5. Laying out contour lines
6. Making a percolation test
7. Observing soil profiles
8. Observing conservation practices
9. Determining soil texture
10. Measuring field acreages

Botanical Activities:

1. Observing fertility plots
2. Identifying weed specimens
3. Applying herbicides correctly
4. Identification of ornamental specimens
5. Pruning ornamental specimens
6. Fertilizing ornamentals
7. Identifying legume and grass specimens
8. Demonstrate grafting procedures
9. Making succession studies
10. Observing seed dispersal

Woodland Activities:

1. Tree identification
2. Leaf collections
3. Cone, nut and seed collections
4. Scaling logs
5. Cruising timber
6. Using power saws
7. Cutting cord wood and lumber
8. Woodlot management
9. Recognize tree insect and diseases
10. Planting trees

Wildlife Activities:

1. Identification of wildlife tracks
2. Planting shrubs for wildlife habitat
3. Building bird houses
4. Establishing field border plantings
5. Inventorying wildlife species
6. Constructing wildlife shelters
7. Photographing wildlife
8. Demonstrating hunter safety
9. Installing safety zone signs
10. Making insect studies

This suggested activity list could be used by the faculty committee in planning participation by each grade level and each department. The ultimate objective would be to have each student in the school system experience the activities which could benefit his educational program.

Publicize the Program

Frequent news stories and photographs in area newspapers can give a desirable emphasis to the outdoor activities in both the minds of the public and those who are the participants in the program. The preparation and presentation of television programs are certainly in the realm of possibilities. Exhibits and demonstrations for public viewing can add to the impact. The development and printing of a brochure which includes a schematic sketch of the area and describes the major features is an effective instrument. Seminars, workshops and special sessions for the development of outdoor teaching skills could add to the growing image of the facility.

Maintain the Facility

The outdoor educational laboratory must reflect the best side of nature. Litter, disrepair, graffiti or damage by vandals can easily and quickly place the facility in disrepute. Evidences of such disruptive acts must be immediately erased. Some methods must be found so that regular maintenance can be established.

Precautions can be taken which will lessen the amount of maintenance required. A first consideration requires that only such man-made features are added which are compatible with the educational use of the area. This lessens the number of things which may be damaged or those which need periodic repair. A second requirement is the development of a sense of stewardship responsibility on the part of every person using the facility. If conservation is to become meaningful to present and future generations, they must be taught to understand, appreciate and revere the land and all its resources.

Regardless of the simplicity of the physical development, there will be a need for constant attention by the director and someone designated who can perform such chores as mowing, planting, spraying and trimming. Three possible sources of such assistance could be obtained by the hiring of a teacher aide, the assignment of a member from the custodial staff or the volunteer help which might be developed from a youth organization such as the FFA or the Boy Scouts.

Keep Records

A history of events that involve the outdoor environmental center can be invaluable. Care should be exercised that the chore not become tedious nor laborious. Consideration could be given to any or all of the following information:

1. Records and dates of events or activities
2. Agenda of special events
3. Dates the various facilities were established
4. Records having special significance
5. Financial records
6. Scrapbook

Records and Dates of Events or Activities

When an annual or other periodic evaluation of the program is made, certain information would serve a purpose. The number of times the laboratory was used and the date of such activity, the number of persons who were involved, the specific purpose that was accomplished and other similar information could be recorded. This could best be accomplished by designing a simple form to be completed by each teacher using the outdoor center and placing it in a file maintained for that purpose.

Agenda of Special Events

Much time and effort is expended in planning special programs. If an agenda for the proceedings were printed or mimeographed, this record could be used in planning future events. It would be particularly useful for those programs which may be established on an annual basis. A file of this information should be kept.

Dates the Various Facilities Were Established

The historical narrative of a developing environmental laboratory will sometime be written. An annual record of any new plantings made, any new structures completed or any new practices established would provide the information needed. Keeping such a record would be the responsibility of the coordinator or director of the program who was knowledgeable of all additions.

Records Having Special Significance

Examples of such records could be monthly or annual meterological data, annual observations on growth of a tree, annual data on fertility plots or any similar records where sequences need to be known.

Financial Records

Most of the records that involve receipts and expenditures, budgetary records, dates of transactions and similar information could be found in the regular accounting system of the school district. However, there may be a purpose in having a duplicate record of financial transactions which have a special significance to the outdoor laboratory.

Scrapbook

Newspaper articles, photographs depicting activities and events and any other memorabilia relavant to the history and accomplishments of the environmental program should be maintained.

SUMMARY OF GUIDELINES

An outdoor education laboratory is a parcel of land and the natural resources that can be produced on it or already exist. Its use is dedicated to the purpose of training and inspiring people in their responsibility of stewardship. It is a place where natural history and conservation principles can be taught and learned in a true-to-life setting. An outdoor classroom can supplement and stimulate the environmental education program of any school. Someone--administrators, faculty or students individually or collectively--needs to take the initiative to examine the possibilities for such a facility in the school program.

The late president, John F. Kennedy, expressed it this way, "I don't think there is anything that could occupy our attention with more distinction than trying to preserve for those who come after us this beautiful country which we have inherited."

APPENDIX A

ORGANIZATIONAL STRUCTURE OF THE DEPARTMENT OF ENVIRONMENTAL RESOURCES COMMONWEALTH OF PENNSYLVANIA

Mines and Land Protection:

Fulton National Bank Building
Third and Locust Streets
Harrisburg, PA 17101 — 717-232-1864

Bureau of Land Protection
Director - Donald A. Lazarchik — 717-787-9870
Bureau of Deep Mine Safety
Director - Walter J. Vicinelly — 717-787-1376
Bureau of Surface Mine Reclamation
Director - William E. Guckert — 717-787-5103
Bureau of Occupational Health
Director - John W. Knauber — 717-787-6526

Air, Water, and Community Protection:

Fulton National Bank Building
Third and Locust Streets
Harrisburg, PA 17101 — 717-232-1864

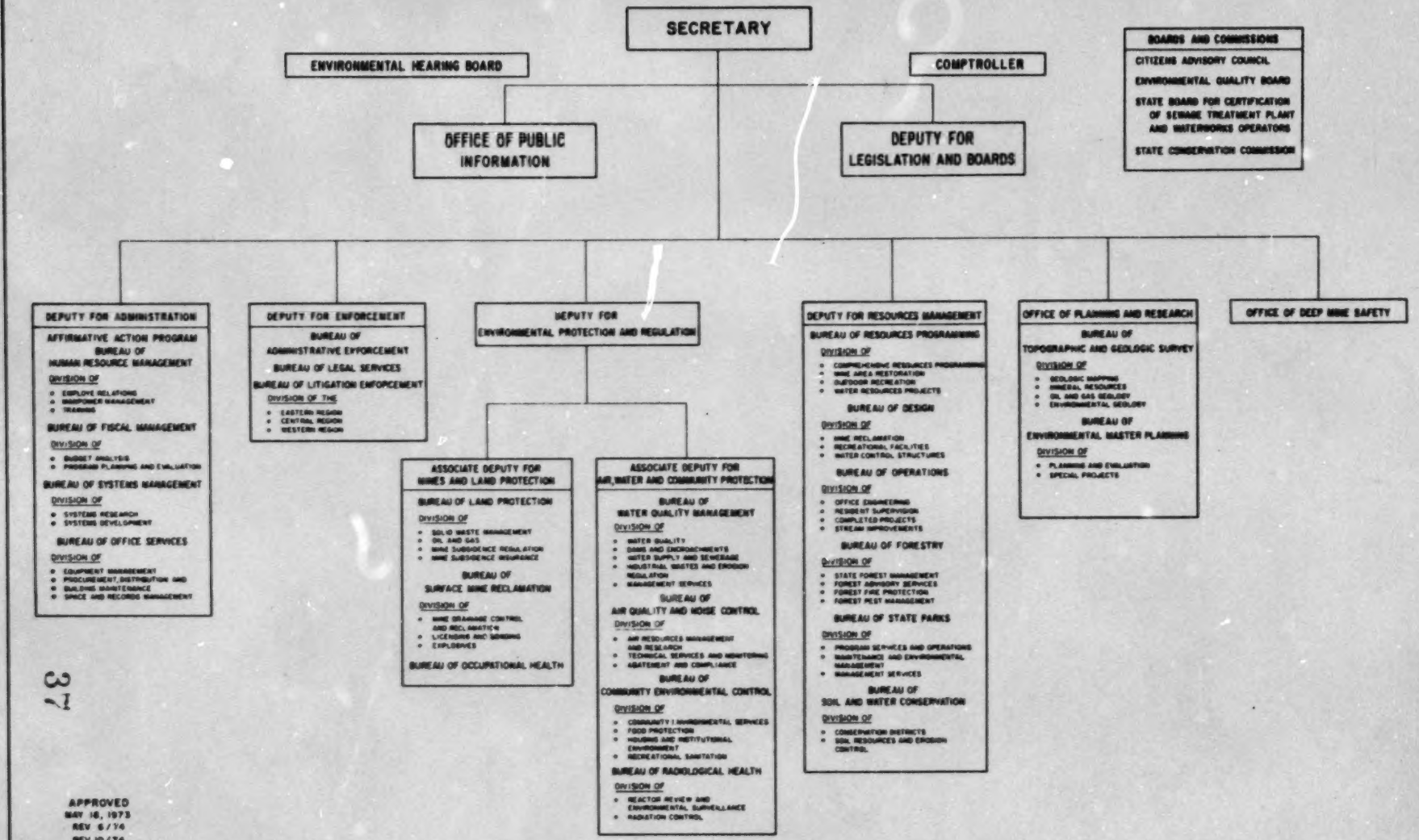
Gureau of Water Quality Management
Director - Walter A. Lyon — 717-787-2666
Bureau of Air Quality and Noise Control
Director - Clark L. Gaulding — 717-787-9702
Bureau of Community Environmental Control
Director - William B. Middendorf — 717-787-3780
Bureau of Radiological Health
Director - Thomas M. Gerusky — 717-787-2480

Resources Management:

Evangelical Press Building — 717-787-2869
Third and Reily Streets
Harrisburg, PA 17101

Bureau of Resources Programming
Director - V. M. Beard — 717-787-6750
Bureau of Forestry
Director - Samuel S. Cobb — 717-787-2703
Bureau of State Parks
Director - William C. Forrey — 717-787-6640
Bureau of Soil and Water Conservation
Director - Walter N. Peechatka — 717-787-5267

DEPARTMENT OF ENVIRONMENTAL RESOURCES



APPROVED
MAY 16, 1973
REV 6/74
REV 10/74

APPENDIX B

EXAMPLES OF OUTDOOR ENVIRONMENTAL EDUCATION LABORATORIES

1. Fairfield Area High School
   Fairfield, PA 17320
   Adams County
   Phone - 717-642-8227

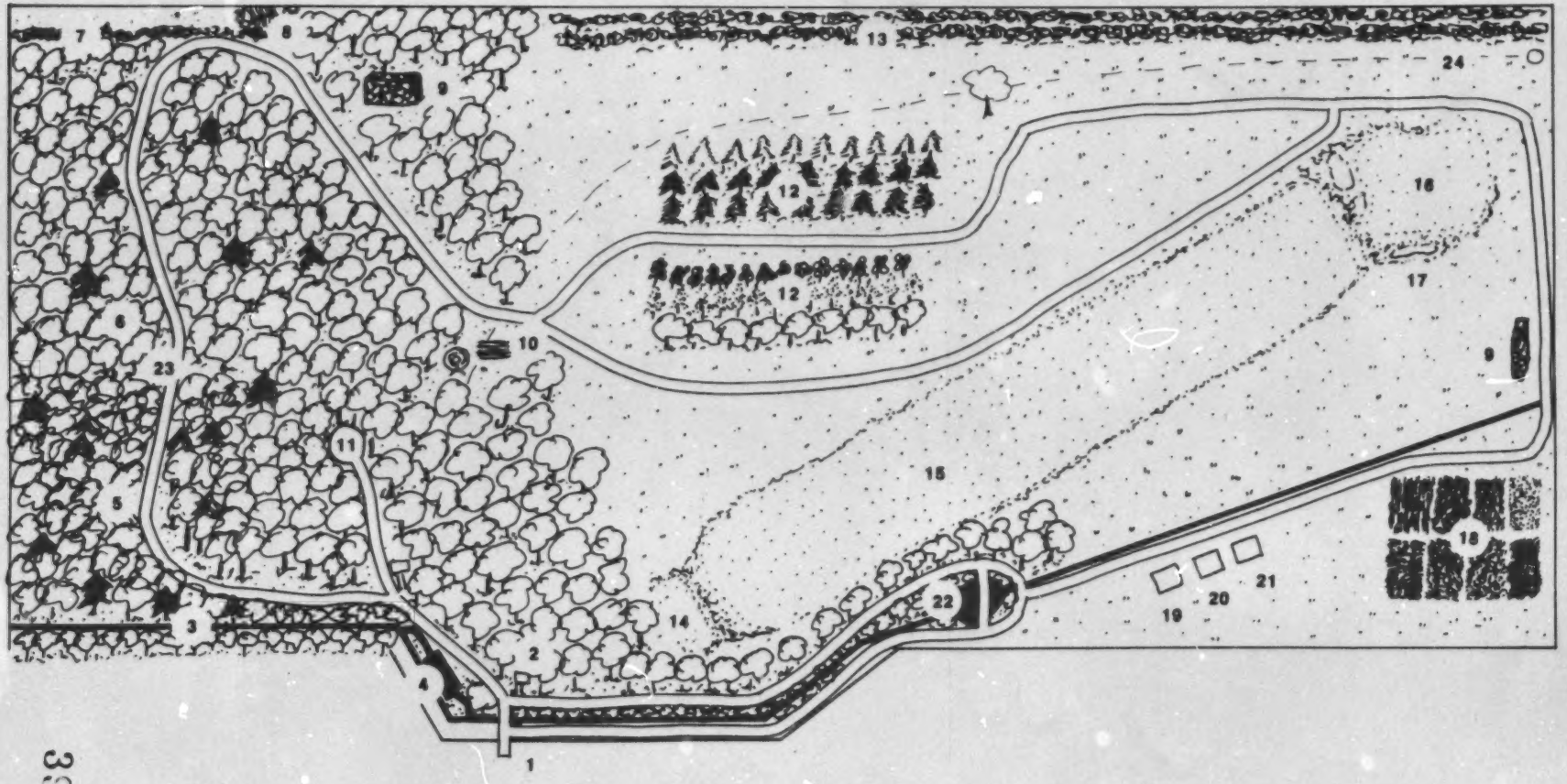
2. Brockway Area High School
   Brockway, PA 15824
   Jefferson County
   Phone - 814-268-4085

3. Penns Valley Area High School
   Spring Mills, PA 16875
   Centre County
   Phone - 814-422-8854

4. Greater Johnstown AVTS
   Johnstown, PA 15904
   Cambria County
   Phone - 814-266-6073

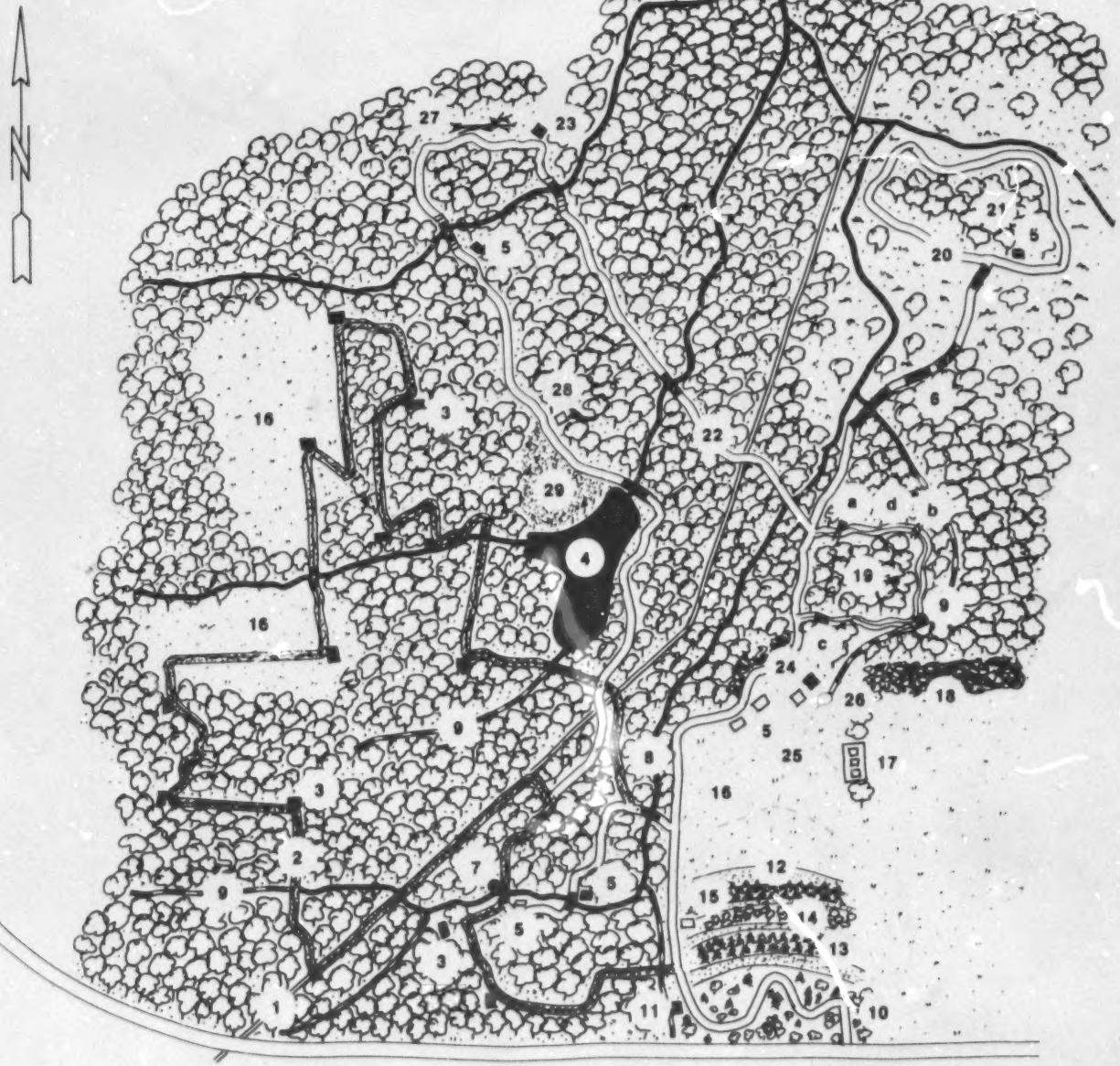
Fairfield Area High School Ecological Lab – 6 Acres

1. Entrance
2. Bulletin Board
3. Stream Improvement
4. Fish Nursery
5. Unmanaged Woodland
6. Managed Woodland
7. Wildlife Border
8. Walk-in-Blind
9. Geological Wall
10. Forestry Exhibit
11. Outdoor Classroom
12. Tree Identification Plots
13. Hedgerow
14. Tee
15. Fairway
16. Green
17. Sand Trap
18. Turf Plots
19. Sundial
20. Air Pollution Station
21. Weather Station
22. Spring
23. Nature Trail (with identification markers)
24. Tile Drainage System

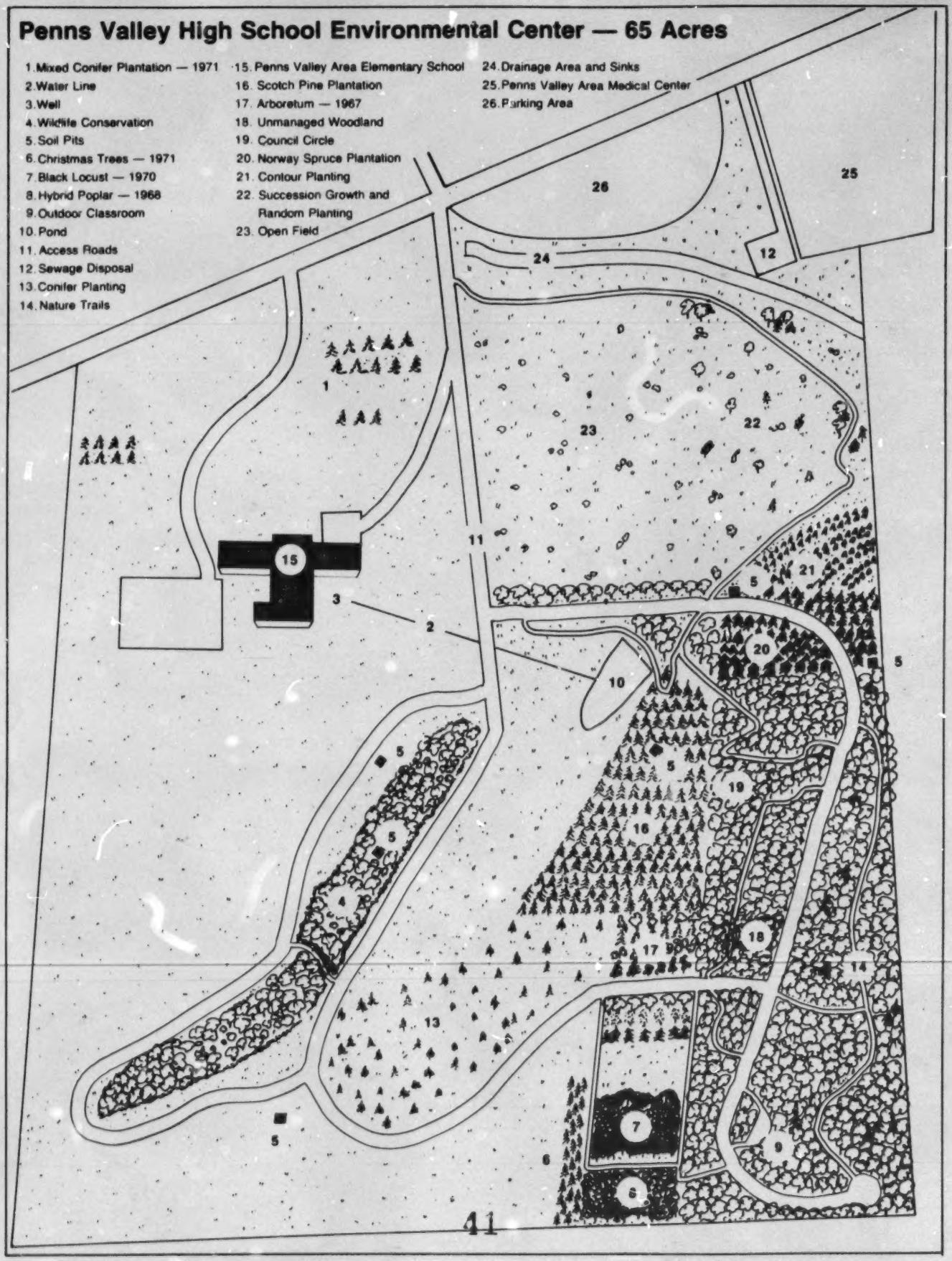


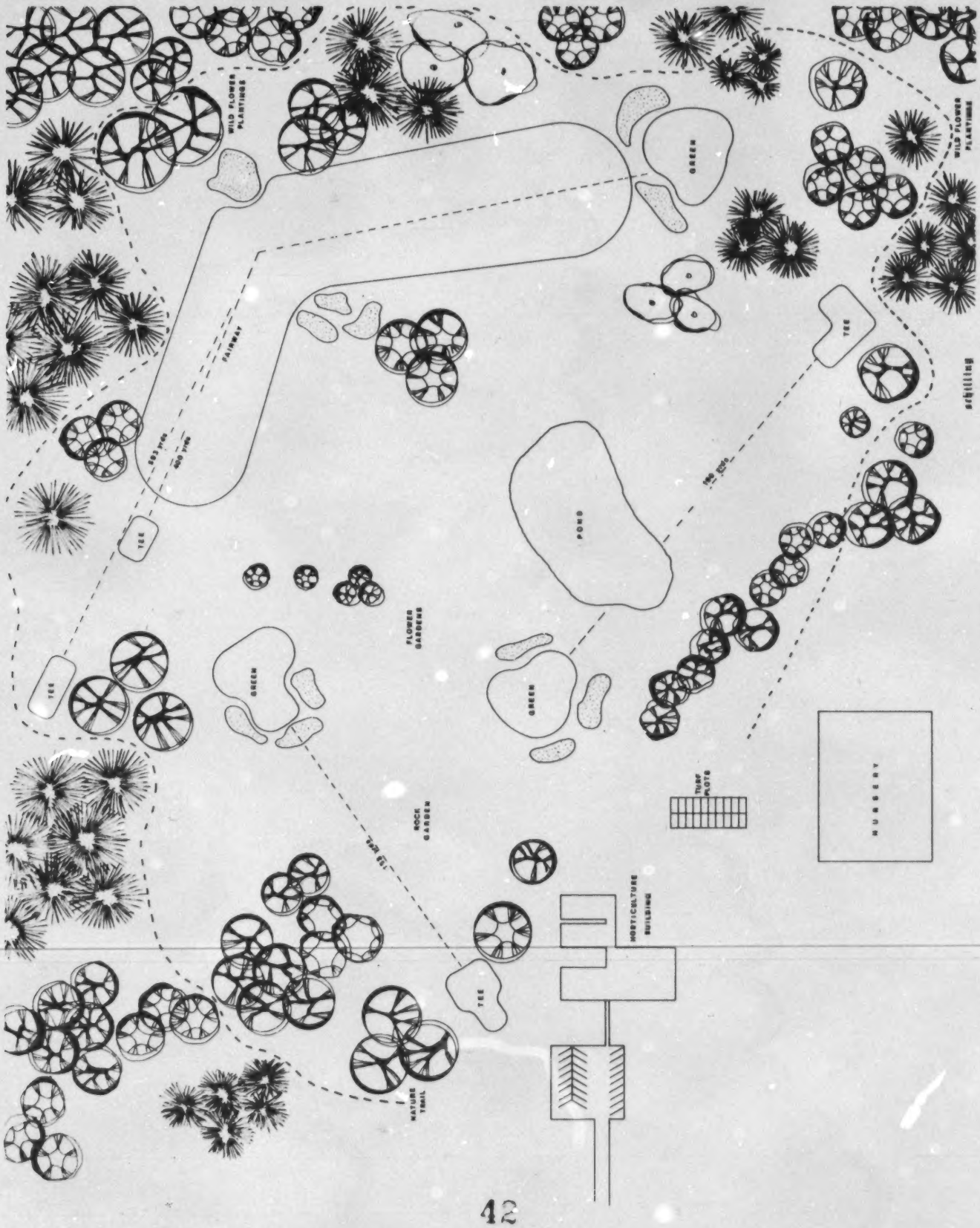
Brockway High School Outdoor Lab – 30 Acres

1. Gas Line
2. Field Archery Trail
3. Field Archery Targets
4. Pond Site
5. Educational Station
6. Bridges
7. Weir Stream Flow Station
8. Stream
9. Dry Stream Bed
10. Arboretum
11. Soil Profile
12. Contours
13. Spruce Plantings
14. Hybrid Poplar Plantings
15. Pine Plantings
16. Open Fields
17. Apiary Yard
18. Border Cuttings
19. Hunters Safety Loop
    a. fence
    b. ditch
    c. farm gate
    d. stiles
20. Island Loop
21. Island in Swamp
22. Nature Trail
23. Air Pollution Station
24. Solar Extractor
25. Tile Drainage System
26. Drop Inlet
27. Tree Walk
28. Wind Throw (mound)
29. Aspen Grove



Penns Valley High School Environmental Center — 65 Acres




WILD FLOWER PLANTINGS
WILD FLOWER PLANTINGS
GREEN
FAIRWAY
TEE
POND
TEE
FLOWER GARDENS
GREEN
GREEN
TEE
TURF PLOTS
NURSERY
ROCK GARDEN
HORTICULTURE BUILDING
TEE
NATURE TRAIL

APPENDIX C

NATIONAL AND STATE CONSERVATION ORGANIZATIONS

American Forest Institute
1835 K. Street, NW
Washington, DC 20036

American Forestry Association
919 17th Street, NW
Washington, DC 20006

Conservation Education Association
UWBG
Green Bay, WI 54302

Conservation Foundation
1717 Mass. Ave. NW
Washington, DC 20036

Izaak Walton League of America
1800 N. Kent St.
Suite 806
Arlington, VA 22209

Keep America Beautiful
00 Park Avenue
New York, NY 10016

National Association of Conservation Districts
Davis Memorial Conservation Library
Post Office Box 776
League City, TX 77573

National Audubon Society
950 Third Avenue
New York, NY 10022

National Conference on State Parks
901 Union Trust Building
Washington, DC 20005

National Council of State Garden Clubs
4401 Magnolia Avenue
St. Louis, MO 63110

National Recreation and Park Assoc.
1601 N. Kent Street, NW
Washington, DC 20036

National Wildlife Federation
1412 16th Street NW
Washington, DC 20036

Nature Conservancy
1800 North Kent Street,
Suite 800
Arlington, VA 22209

Sierra Club
1050 Mills Tower
San Francisco, CA 94104

Soil Conservation Society of America
7515 Northeast Ankeny Road
Ankeny, IA 50021

The Wilderness Society
1901 Penn Avenue NW
Washington, DC 20006

Wildlife Management Institute
709 Wire Building
Washington, DC 20005

NOTE: The addresses of many of these organizations are subject to frequent change. The National Wildlife Federation (listed above) publishes an annual directory of conservation and environmental organizations which can be purchased.

APPENDIX D

LIST OF MAGAZINES APPROPRIATE FOR ENVIRONMENTAL EDUCATION PROGRAMS

American Forests
American Forestry Association
919 17th Street, NW
Washington, DC 20006

Audubon Magazine
National Audubon Society
950 Third Avenue
New York, NY 10022

Conservation News
National Wildlife Federation
1412 Sixteenth Street, NW
Washington, DC 20036

Environment
Circulation Department
Box 755
Bridgeton, MO 63044

Environmental Science and Technology
Office of the Controller
1155 16th Street, NW
Washington, DC 20036

Exxon USA
A Division of Exxon Corporation
P. O. Box 2180
Houston, TX 77001

National Parks and Conservation Magazine
National Parks and Conservation Association
1701 18th Street, NW
Washington, DC 20009

National Wildlife
National Wildlife Federation
1412 Sixteenth Street, NW
Washington, DC 20036

Only One Earth
312 Old Main
The Pennsylvania State University
University Park, PA 16802

Pennsylvania Forests
The Pennsylvania Forestry Association
5221 East Simpson Street
Mechanicsburg, PA 17055

Pennsylvania Game News
Pennsylvania Game Commission
South Office Building
Capitol, P. O. Box 1567
Harrisburg, PA 17120

Ranger Rick
National Wildlife Federation
1412 Sixteenth Street, NW
Washington, DC 20036

Soil Conservation
Superintendent of Documents
Government Printing Office
Washington, DC 20402

Teamwork
State Conservation Commission
Third and Reily Streets
Harrisburg, PA 17120

The Conservationist
Box 2328
Grand Central Station
New York, NY 10017

The Journal of Environmental Education
Helen Dwight Reid Education Foundation
4000 Albermarle St., NW
Washington, DC 20016

APPENDIX E

Sources of Curriculum Materials and Guides for Developing Environmental Education Laboratories

Mrs. Eleanor Bennett and
Mr. Robert Schwille
Environmental Education Advisers
Bureau of Curriculum Services
Pennsylvania Department of Education
Harrisburg, Pennsylvania 17126

Dr. Jerold E. Elliott, Assoc. Professor
Health and Physical Education and
Recreation
272 Recreation Building
The Pennsylvania State University
University Park, Pennsylvania 16802

Dr. Theodore M. Johnson
Curriculum Materials Center
401 Rackley Building
The Pennsylvania State University
University Park, Pennsylvania 16802

Nolde Forest State Park
Environmental Education Center
RD 1, Box 392
Reading, Pennsylvania 19607

KARE (Knowledgeable Action to Restore
Our Environment)
Rt. 73 and Butter Pike
Blue Bell, Pennsylvania 19422

Environmental Education: A bibliography pertaining to the environment, environmental education, and environmental education programs and materials. Compiled by Thomas F. Pepe, 117 W. Ridge Pike, Conshohocken, Pennsylvania 19428.

Environmental Learning Resources: Ohio Department of Education, Columbus, Ohio. An annotated catalog prepared under an ESEA Title III grant by the Center for the Development of Environmental Curriculum, Willoughby - Eastlake City Schools, Willoughby, Ohio 44094.

Conservation Education: A selected bibliography materials for teaching conservation and resource use. The Interstate Printers and Publishers, Danville, Illinois 61832.

Natural Resources and Career Awareness: A Teacher's Guide for Grades K-6
Exploring Occupations in the Natural Resources: A Student Resource Guide for the Middle School
Occupational Preparation in the Natural Resources: A Suggested High School Curriculum Guide
Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

A Nature Center for Your Community
Manual of Outdoor Conservation Education
Manual of Outdoor Interpretation
Planning a Nature Center
Trail Planning and Layout
Wildlife Habitat Improvement
National Audubon Society, Nature Centers Division, 1130 Fifth Avenue, New York, New York 10028

Outdoor Classrooms on School Sites PA-975
Teaching Soil and Water, A Classroom Field Guide PA-341
An Outline for Teaching Conservation in Elementary Schools PA-268
Outdoor Classrooms for Environmental Studies 35:199
U. S. Department of Agriculture, Soil Conservation Service

Conservation Activities for Young People
Teaching Conservation Through Outdoor Areas PA-837
Teaching Materials for Environmental Education
U. S. Department of Agriculture Forest Service

Ecology Primer Series

Chemicals--The Body Breakers
Population--How Many Are Too Many
Pesticide--Mist of Death
Water--Our Troubled Waters
Trash--Our Wounded Land
Noise--The Unseen Enemy
Air Pollution--The World' Exhaust
Pendulum Press Inc., The Academic Building, Saw Mill Road, West Haven, Connecticut 06516